



OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced GCE

CHEMISTRY

Transition Elements



2815/06

Monday

26 JUNE 2006

Morning

50 minutes

Candidates answer on the question paper.

Additional materials:

Data Sheet for Chemistry

Scientific calculator

Candidate
Name

Centre
Number

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

Candidate
Number

| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

TIME 50 minutes

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Write your answers, in blue or black ink, in the spaces provided on the question paper.
- Pencil may be used for diagrams and graphs **only**.
- Do not write in the bar code. Do not write in the grey area between the pages.
- **DO NOT WRITE IN THE AREA OUTSIDE THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.**

FOR EXAMINER'S USE

| Qu | Max. | Mark |
|--------------|-----------|------|
| 1 | 10 | |
| 2 | 6 | |
| 3 | 10 | |
| 4 | 10 | |
| 5 | 9 | |
| TOTAL | 45 | |

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- You may use a scientific calculator.
- You may use the *Data Sheet for Chemistry*.
- You are advised to show all the steps in any calculations.

This question paper consists of 11 printed pages and 1 blank page.



Answer **all** the questions.

1 Some standard electrode potentials are shown below.

| | E^\ominus / V |
|--|------------------------|
| $\text{Ag}^+ + \text{e}^- \rightleftharpoons \text{Ag}$ | + 0.80 |
| $\frac{1}{2}\text{Cl}_2 + \text{e}^- \rightleftharpoons \text{Cl}^-$ | + 1.36 |
| $\text{Cu}^{2+} + 2\text{e}^- \rightleftharpoons \text{Cu}$ | + 0.34 |
| $\text{Fe}^{3+} + \text{e}^- \rightleftharpoons \text{Fe}^{2+}$ | + 0.77 |
| $\frac{1}{2}\text{I}_2 + \text{e}^- \rightleftharpoons \text{I}^-$ | + 0.54 |

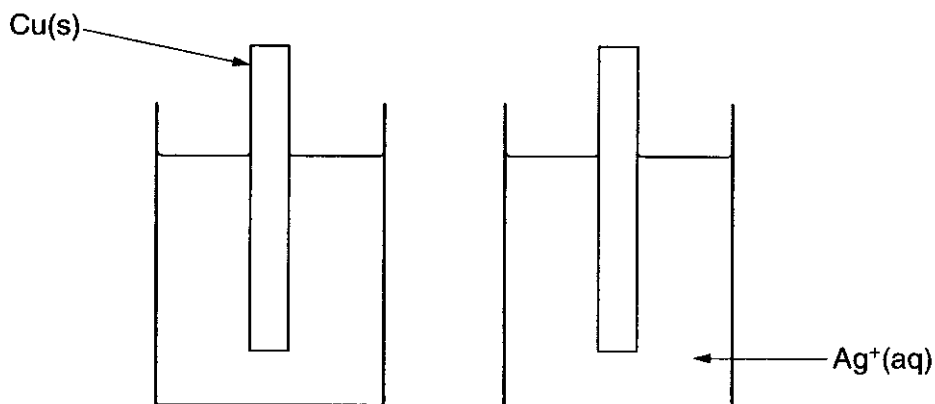
(a) Define the term *standard electrode potential*.

.....

.....

.....

..... [3]

(b) The diagram below shows an incomplete cell consisting of Cu/Cu^{2+} and Ag/Ag^+ half-cells.

(i) Complete and label the diagram to show how the cell potential of this cell could be measured. [2]



3

- (ii) On the diagram, show the direction of **electron** flow in the circuit if a current was allowed. [1]
- (iii) Calculate the standard cell potential.

standard cell potential =V [1]

- (iv) Write the overall cell reaction.

..... [1]

- (c) Chlorine will oxidise Fe^{2+} to Fe^{3+} but iodine will not. Explain why, using the electrode potential data.

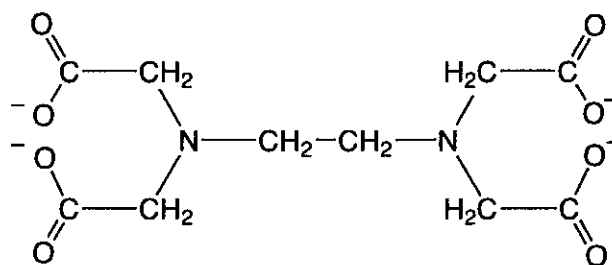
.....
.....
.....
..... [2]

[Total: 10]

[Turn over



(c) The edta^{4-} ion has the following structure.



- (i) Put a ring around two different types of atom in the edta^{4-} ion that are capable of forming a dative covalent bond with the Ni^{2+} ion. [2]
- (ii) What feature of these atoms allows them to form a bond with Ni^{2+} ? [1]

..... [1]

[Total: 6]

[Turn over



3 Platinum forms complexes with a co-ordination number of 4.

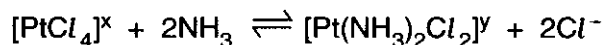
(a) (i) Explain the term *co-ordination number*.

.....
 [1]

(ii) State the shape of these platinum complexes.

..... [1]

(b) The tetrachloroplatinate(II) ion readily undergoes the following reaction.



(i) What type of reaction is this?

..... [1]

(ii) Suggest values for x and y in the equation.

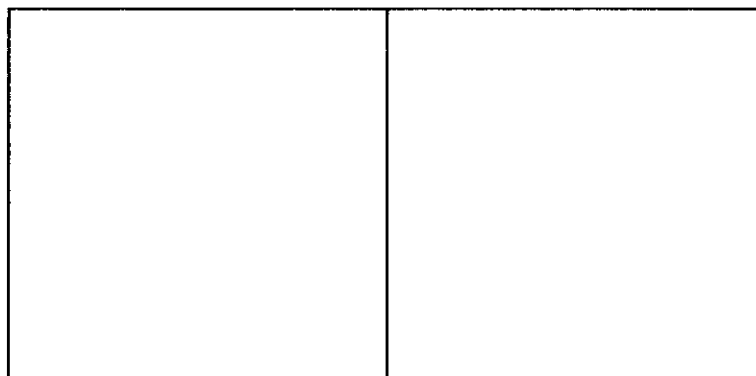
x =

y =

[2]

(c) The complex $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]^{y-}$ exists in two isomeric forms.

(i) Draw diagrams to show the structure of these isomers.



[2]

(ii) What type of isomerism is this?

..... [1]



- (iii) One of the isomers of $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]^y$ is an important drug used in the treatment of cancer.

How does this drug help in the treatment of cancer?

.....

.....

.....

..... [2]

[Total: 10]

[Turn over



